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Title Power Recovery in Printer Fusing Systems

Abstract Printer fusing systems store a large amount of heat energy even after the printer is turned off. It can be thought of as a large thermal battery. The stored heat energy in the fusing system can be so large that it causes damage to components in the printer if the power to the cooling fans were to be accidentally lost.

> For example, the HP LaserJet 9000 requires fuser cooling fans to operate for 15 minutes after the printer is turned off to cool the platen rollers as well as the Intermediate transfer belt. If this cooling is not performed waste toner on the belt will fuse and create print quality defects.

All past color laser printers have required either an auxiliary power supply or a special power supply with timed residual power to maintain fan operation after the user has turned off the printer. If the printer were to be removed from the power source this operation could not be performed and results in print quality defects when printing is resumed in the future.

The invention utilizes the Seebeck effect to generate electrical energy from the thermal energy stored in the fusing system to maintain cooling fan operation even if all electrical power sources are removed from the printer.



Attachments

Power_Recovery_in_Printer_Fusing_Systems1.jpg -10:31AM page 1 from lab book (Uploaded by Mark Hirst)



Description of Invention

Problems Solved Printer fusing systems store a large amount of heat energy even after the printer is turned off. It can be thought of as a large thermal battery. The stored heat energy in the fusing system can be so large that it causes damage to components in the printer if the power to the cooling fans were to be accidentally lost.

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Exhibit A

Disclose 4.5 - HP Invention Disclosure System

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when printing is resumed in the future.

The invention utilizes the Seebeck effect to generate electrical energy from the thermal energy stored in the fusing system to maintain cooling fan operation even if all electrical power sources are removed from the printer.

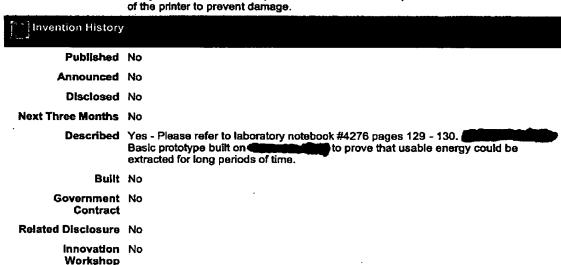
Prior Solutions Prior solutions require auxiliary power supplies or a special power supply with timed residual power to the printer to maintain cooling fan operation. If the electrical power source were removed the cooling would not be performed and the print quality of the printer would degrade.

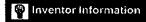
Description Please refer to laboratory notebook #4276 pages 129 - 130.

Basically, a thermoelectric power converter is attached to the print engine metal frame and allowed to mechanically engage the sheet metal frame of the fusing system. This creates a thermal gradient across the thermal-electric generator and a voltage results with usable amounts of electric current. This recovered electrical power is then used to power the fuser cooling fans.

Advantages

The wasted thermal energy of the fusing system is recovered to power the fusing system cooling fans. This eliminates the electrical load of the cooling fans on the DC power supply and allows the fans to continue operation even if the printer is disconnected from its main power source. This allows the cooling fans to run for many tens of minutes after power is removed from the printer and cools the interior





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Exhibit A

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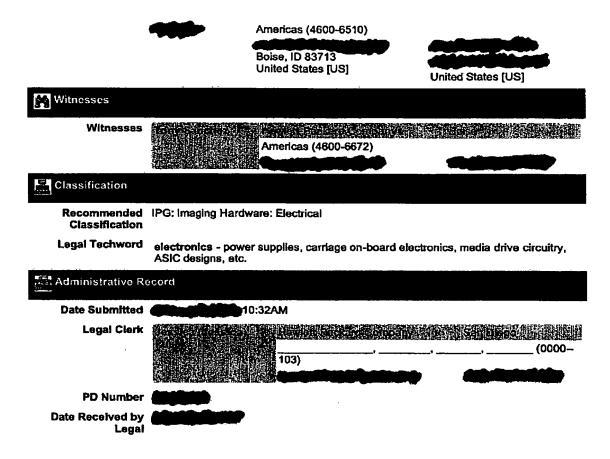


Exhibit A

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Exhibit A

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